

REVISION AND PHYLOGENETIC ANALYSIS OF THE NEW WORLD GENUS
ONEIDA HULST (LEPIDOPTERA: PYRALIDAE: EPIPASCHIINAE),
DESCRIPTION OF A NEW GENUS AND COMMENTS ON THE
CODING OF SCALE COLOR CHARACTERS

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Abstract.—The genus *Oneida* is revised, and five species are recognized: *lunulalis* Hulst (the type species); *mejona* Schaus; *marmorata* Schaus; *luniferella* Hulst; *grisiella* new species. *Oneida diploa* Dyar is designated a **junior synonym** of *O. luniferella* Hulst. *Dasyvesica* Solis, the sister group of *Oneida*, is described as a new genus. It includes several **new combinations**: *D. nepomuca* Schaus, *D. lophotalis* Hampson, and *D. crinitalis* Schaus. An estimated phylogeny of the species of *Oneida* is presented. The use of unpolarized scale color characters is discussed.

Key Words: *Oneida*, *Dasyvesica*, Pyralidae, phylogeny

Oneida was described by Hulst in 1889 based on one species, *lunulalis* Hulst. The present concept of *Oneida* includes five species, *lunulalis* Hulst, the type species, *luniferella* Hulst, *mejona* Schaus, *marmorata* Schaus, and a new species, *grisiella* Solis. The members of this genus occur in Central America north into the eastern and western areas of North America. The new species is from West Texas. Based on a phylogenetic study of related genera of the Epipaschiinae (Solis 1989), *Oneida* is closely related to *Dasyvesica*, a new genus with a neotropical distribution.

Rarely has scale color been used as a character in cladistic studies of Lepidoptera (e.g. Mitter and Silverfine 1988), but a developmental basis does give taxonomic value to scale color characteristics. In this paper the developmental basis of chemically induced scale color is applied to the coding of

certain color scales in delimited areas of the wing. Such additional information supported morphological data and resolved a trichotomy.

MATERIALS AND METHODS

Names applied to wing veins and markings correspond to those used by Forbes (1923) and Wootton (1979). The forewing length is measured from base to apex including fringe. The width is measured from apex to anal angle. Terminology applied to structures of the genitalia follow Klots (1956). All measurements correspond to the mean value when more than one specimen was dissected. Data on the specimen labels is reported exactly as written.

The cladistic analysis was executed with the Hennig86 program by J. S. Farris on a character matrix (Table 2) of 6 taxa and 16 characters. The matrix consisted of twelve binary and four three-state characters. The analysis produced the best estimate of the relationships among taxa based on a min-

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imum number of character transformations. Each character transformation series is polarized, that is, the direction of the supposed evolution of a character from a plesiomorphic to an apomorphic state is determined. Polarization in this study was accomplished with the outgroup method. The genus *Dasyvesica* Solis was chosen as the outgroup after inspection of the related genera (Solis 1989).

The material examined is deposited in the following institutions: AMNH—American Museum of Natural History, New York City, New York; CNC—Canadian National Collection, Agriculture Canada, Ottawa, Canada; LEM—Lyman Entomological Museum, McGill University, Ste. Anne de Bellevue, Quebec, Canada; LACM—Los Angeles County Museum of Natural History, Los Angeles, California; MCZ—Museum of Comparative Zoology, Cambridge, Massachusetts; UCB—Essig Museum of Entomology, University of California, Berkeley, California; USNM—National Museum of Natural History, Smithsonian Institution, Washington, D.C.

RESULTS

Hulst (1889) described the genus *Oneida* based on the “invisibility” of the maxillary palpus and the presence of only one pair of spurs on the male hind tibia. But *Oneida* does have maxillary palpi and many other genera also have only one pair of spurs. Other genera share similar wing venation with *Oneida*.

Hampson (1896) synonymized *Tioga* Hulst, *Tallula* Hulst, and *Oneida* based on the length of the labial palpus and the wing venation but later recanted the synonymy in an unpublished manuscript. Janse (1931) stated that Hampson was correct in recognizing *Oneida* as a separate genus in unpublished work because of pronounced differences in the wing venation and tibial spurs between *Oneida* and *Tioga*. I found that one pair of tibial spurs in the male and two pairs in the female are found in a large number

of genera (including *Oneida* and *Tallula*) in the Epipaschiinae (Solis 1989). *Tioga* and *Tallula* are not synonyms of *Oneida* and their status will be discussed in a future publication.

Oneida is diagnosed by one autapomorphy, the base of the juxta lacking a medial lobe, but with a convex midventral deformation. Based on an analysis of the *Pococera*-complex (Solis 1989), the genus *Oneida* is defined additionally by one homoplasious character, a simple second, unmodified labial segment, which also occurs in *Tallula*, *Chloropaschia* Hampson, *Roeseliodes* Warren, *Cecidipta* Berg, *Deuterololyta* Lederer, *Anarnatula* Dyar, *Cacozelia* Grote, *Toripalpus* Grote, and several undescribed genera. The sister group relationship of *Oneida* and *Dasyvesica*, a new genus herein described, is well defended by two unique synapomorphies and one homoplasy. They share a “sclerite” whose anterior portion reaches a midventral position; in most epipaschiines the “sclerite” does not reach a midventral position. The “sclerite” is a section of the tegumen, postero-ventrally articulating with the gnathos and anteriorly has an extension of various lengths, that is highly sclerotized and separated by membrane from the dorsal part of the tegumen. The presence of this “sclerite” is a synapomorphy of the Epipaschiinae (Solis 1989). *Oneida* and *Dasyvesica* share a juxta without lobes; the common condition is the presence of a medial lobe. They also share the lack of the sclerotized, U-shaped structure at the base of the uncus, but this structure has been lost independently in several other genera of the *Pococera*-complex (Solis 1989).

Oneida has a postmedial line concave proximally only from the costa to M_2 ; in *Dasyvesica* it is concave from the costa to M_1 and then again at CuA_1 to the posterior margin of the wing. *Oneida* has prominent black scales proximal to the postmedial line from the costa to M_2 , and *Dasyvesica* has dark scales proximal to the median line from

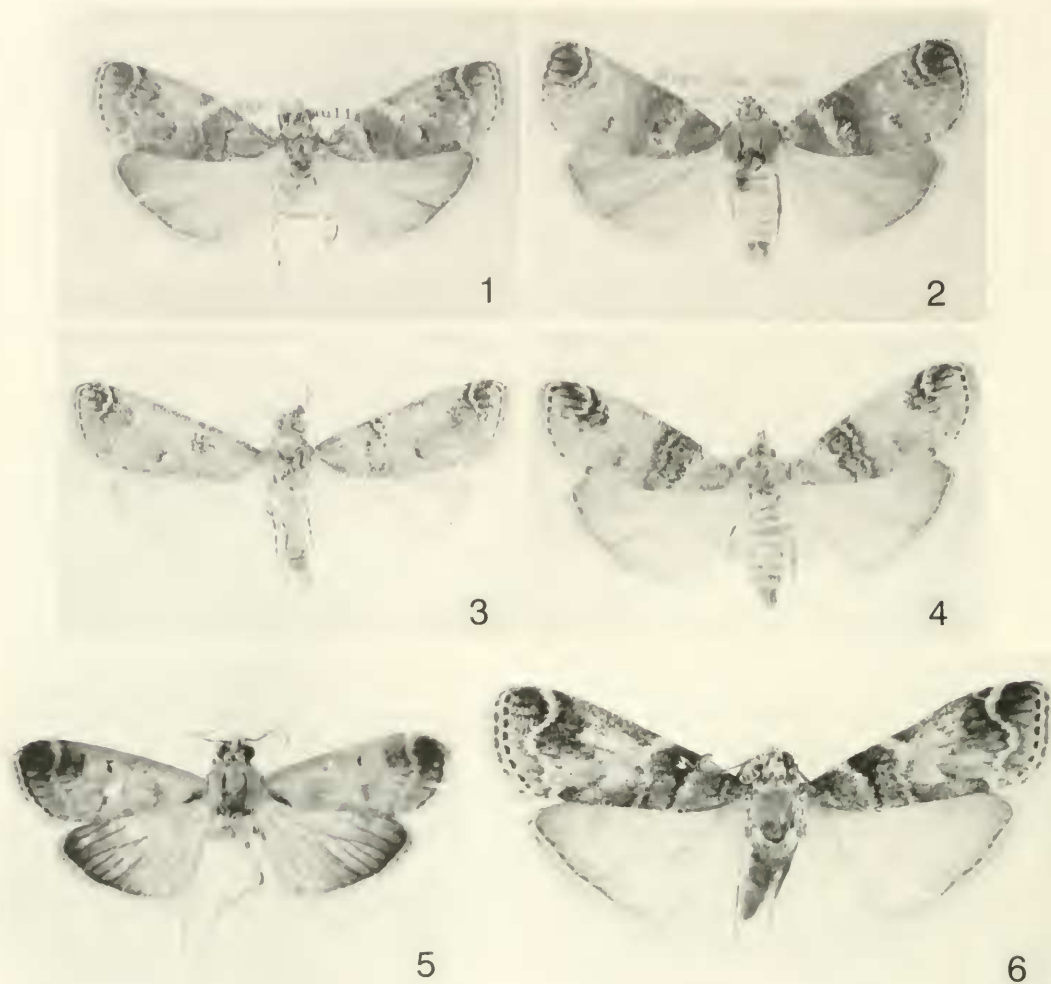


Fig. 1. *Oneida mejona* Schaus, male, dorsal surface, Mexico, Tamaulipas, 12 mi. SW Cd. Victoria.

Fig. 2. *Oneida lunulalis* Hulst, male, dorsal surface, North Carolina, Macon Co. Highlands.

Fig. 3. *Oneida grisiella* new species, male, dorsal surface, Texas, Jefferson Davis Co., Mt. Locke Davis Mtns.

Fig. 4. *Oneida luniferella* Hulst, male, dorsal surface, Arizona, Santa Cruz Co., Santa Rita Mtns., Madera Canyon.

Fig. 5. *Dasyvesica nepomuca* Schaus, male paratype, dorsal surface, eastern Bolivia, R. Japacani.

Fig. 6. *Oneida marmorata* Schaus, male, dorsal surface, Costa Rica, Volcan Poas, Alajuela Province.

M_2 to $1A+2A$. The medial line is not present in *Oneida*. *Oneida* is diagnosed by a juxta slightly convex midventrally, without a medial lobe, whereas *Dasyvesica* also lacks a medial lobe, but midventrally it is flat. *Oneida* has a simple second labial segment, but *Dasyvesica* has a tubulate second labial

segment that surrounds specialized setae of the maxillary palpus. In *Oneida* the third maxillary segment arises from the apex of the second segment, and in *Dasyvesica* the third segment arises from the base of the second segment.

Morphology and distribution of charac-

ters.—Table 1 is a list of the characters and states used in the construction of a cladogram for *Oneida*.

Character 1 is the length of the valva in relation to the apex of the uncus. A valva that is equal to or extending beyond the apex of the uncus is a synapomorphy of *lunulalis*, *grisiella*, and *luniferella*. The other two species in *Oneida* have the plesiomorphic state, a valva that does not reach or extend beyond the uncus apically.

Character 2 is the length of the uncus. This measurement was taken as a result of character one because the relationship of the valva to the uncus may not be correlated. *Mejona* and *marmorata* have the apomorphic state of the uncus being greater than 0.40 mm in length and *luniferella*, *grisiella*, and *lunulalis* have the plesiomorphic state where the uncus is less than 0.40 mm in length.

Character 3 is the relationship of the width of the apex of the uncus to its width at the midpoint. The apomorphic state that the uncus is less wide at the apex than at the midpoint is a synapomorphy for *mejona* and *marmorata*. The remaining three species have the plesiomorphic state, an uncus that is wider at the apex than at the midpoint.

Character 4 is the shape of the juxta anteromesally. The juxta is convex in *Oneida* and is a synapomorphy of *Oneida*. The juxta is flat in *Dasyvesica*.

Character 5 is the presence or absence of a heavy patch of thick setae on the sacculus of the valva. The presence of these setae is a synapomorphy for *Dasyvesica*.

Character 6 is the degree of sclerotization of the juxta at the base (anterior) in comparison to the arms. A synapomorphy for *Dasyvesica* is a base more heavily sclerotized than the arms, and in *Oneida* the arms and base are uniformly sclerotized.

Character 7 is the signum length in relation to the diameter of the signum base. The signum base is a circle contiguous with the membrane of the corpus bursae and extends internally like a cone. The cone is measured

Table 1. Characters and states used in construction of cladogram for *Oneida* (see text for discussion of polarization).

1. Valva length	0 not extending to uncus apex 1 equal to or extending beyond uncus apex
2. Length of uncus	0 less than 0.40 mm 1 greater than 0.40 mm
3. Width of uncus at apex in relation to width at midpoint	0 wider at apex than at midpoint 1 equally wide or less wide at apex than at midpoint
4. Juxta convex midventrally	0 absent 1 present
5. Sacculus with dense patch of bristles	0 absent 1 present
6. Sclerotization at base of juxta in comparison with arms	0 equal 1 more heavily sclerotized
7. Signum length in relation to diameter of base	0 longer than base 1 equal to or less than base
8. Length of posterior apophysis	0 greater than 0.60 mm 1 less than 0.60 mm
9. Patch of longer scales on underside of hindwing where CuA ₂ meets discal cell	0 absent 1 present
10. Color of scales on basal area of forewing	0 red 1 green 2 black
11. Color of scales on postmedial line from R ₅ to M ₂ of the forewing	0 brown 1 red 2 black
12. Terminal line of forewing	0 brown 1 black
13. Color of scales on apical area of male forewing	0 brown 1 beige 2 black
14. Color of scales on costal margin to R ₄ on the underside of male forewing	0 red 1 white
15. Color of scales on underside of forewing posterior to R ₄	0 beige 1 red 2 white
16. Color of scales on costal margin to R ₄ on the underside of the male hindwing	0 brown 1 red

as the signum length. An autapomorphy for *marmorata* is a signum length equal to or less than the diameter of the base. The remaining four species have the plesiomorphic state of a signum longer than the diameter of the base.

Character 8 is the length of the posterior apophysis in the female genitalia. An autapomorphy for *mejona* is the length of the posterior apophyses less than 0.60 mm. In the remaining species the length is greater than 0.60 mm.

Character 9 is a patch of scales that is longer than the surrounding scales on the underside of the hindwing where the base of CuA₁ meets the discal cell. This character is an autapomorphy of *luniferella* and is the main external character that distinguishes *luniferella* from *grisiella* which lacks the long patch of scales. The remaining species also lack the patch of longer scales.

Characters 10 through 16 are vestiture characters, but they could not be polarized. *Dasyvesica* species have scale color characteristics not shared with *Oneida*. Also, many Epipaschiinae have green-tinted wings in life, but this color fades to brown or dullish-yellow after they are preserved. Many of the specimens of *Dasyvesica* were faded.

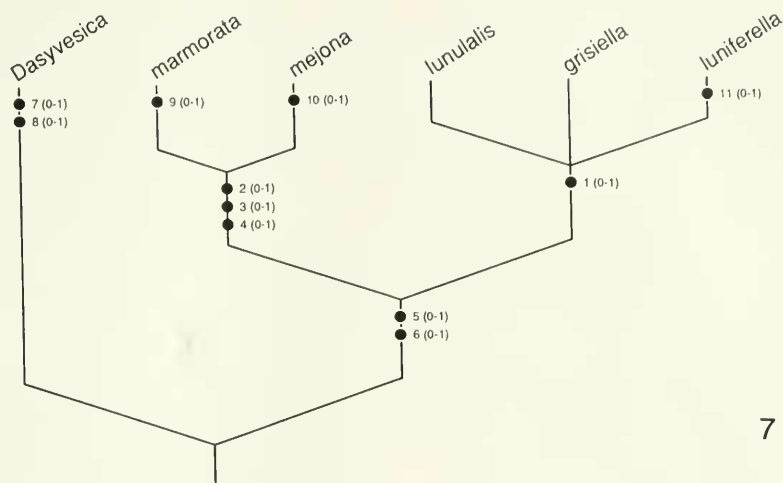
Character 10 is the color of scales on the basal area of the forewing. Character 11 is the color of the scales on the postmedial line from R₅ to M₂ of the forewing. Character 12 is the presence of a black terminal line and is an autapomorphy of *grisiella*. Character 13 is the color of the scales on the apical, membranous area of the forewing. Character 14 is the presence of red scales on the costal margin to R₄ on the underside of the male forewing. Character 15 is the color of the scales on the underside of the forewing posterior to R₄. Character 16 is the presence of red scales on the costal margin to R₄ on the underside of the male hindwing in *mejona* and *marmorata*.

A diversity of selective pressures, i.e. environmental, predation, etc., have been recognized to be the cause of scale color vari-

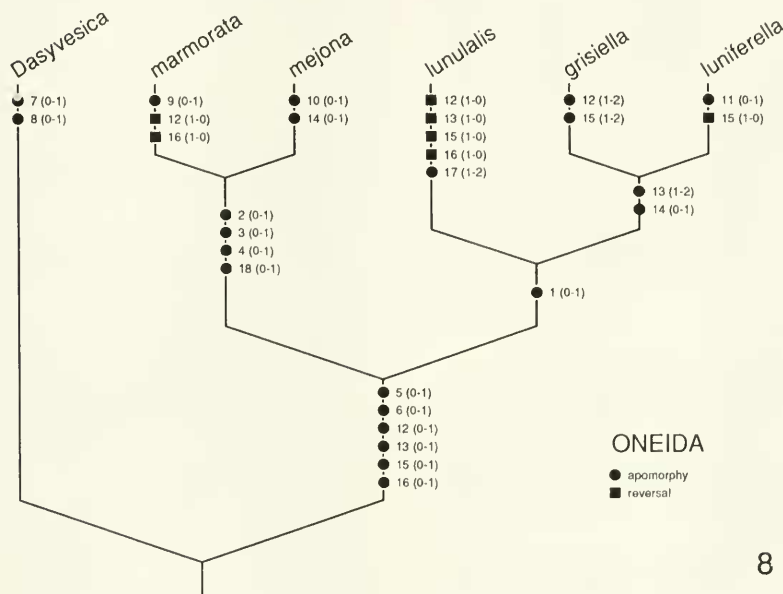
ation. Crypsis, aposematic coloration and mimicry are common in moths and are the results of such pressures. However, Nijhout (1980) has shown that the precursor of each scale is one epidermal cell, and in most cases the color of the scale is determined by the kind of pigment present. The different shades of a color are believed to be caused by the concentration of the pigment in the scale. The overall color of an area is merely a collection of a few monochrome scales. As coded, the character state is the overall color depending upon the number of scales of a certain color present (i.e. the state "cinnamon" contains more red scales than the "brown" state). Also, if two species share the presence of a scale color they have inherited the ability to produce enzymes for pigment synthesis from a common ancestor. Nijhout (1978) also stated that "... the pattern of each wing-cell (areas on a wing bordered by wing veins) is determined independently from the pattern in other cells." In the case of *Oneida*, the species-specific presence of red scales in only certain areas on the underside of the wings is obvious in characters 14, 15, and 16.

As mentioned previously, these characters could not be polarized because states are not shared between the ingroup and outgroup. Without an understanding of the exact chemical composition, evolution and genetic control of these pigments it is impossible to determine whether the presence of certain pigments is derived. The Hennig86 program has the capability to include unpolarized data in the analysis; and, in the case of *Oneida*, scale color characters support morphological characters and resolve a trichotomy.

Phylogenetic analysis.—The character matrix (Table 2) was analyzed in two steps to determine the effect of unpolarized scale color characters. First, a matrix using only characters 1 to 9, excluding all scale color characters, was analyzed. This produced a tree with a length of 9, a consistency index of 100, and a retention index of 100 (Fig.



7



8

Fig. 7. Cladogram of *Oneida* excluding scale color characters.
Fig. 8. Cladogram of *Oneida* including scale color characters.

7). The next analysis, including the scale color characters (characters 10–16), produced one tree with a length of 24, a consistency index of 83, and a retention index of 66 (Fig. 8). The two trees are identical, except that the second analysis resolved the trichotomy of *lunulalis*-*luniferella*-*grisiella* showing *luniferella* and *grisiella* as sister species.

TAXONOMIC REVISION

Oneida Hulst

Oneida Hulst, 1889: 63. Type species: *Oneida lunulalis*, Hulst, 1889, by monotypy.

Diagnosis.—*Oneida* is diagnosed by one autapomorphy, the base of the juxta is convex midventrally, and one homoplasious character, a simple second labial segment,

Table 2. Character matrix for the genus *Oneida*. *Dasyvesica* is the outgroup.

Taxa	Characters															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
<i>Dasyvesica</i>	0	0	0	0	1	1	0	0	0	?	?	?	?	?	?	?
<i>mejona</i>	0	0	1	1	0	0	0	1	0	1	1	0	1	1	1	1
<i>luniferella</i>	1	1	0	1	0	0	0	0	1	2	2	0	0	1	0	0
<i>grisiella</i>	1	1	0	1	0	0	0	0	0	2	2	1	2	1	2	0
<i>lunulalis</i>	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
<i>marmorata</i>	0	0	1	1	0	0	1	0	0	0	1	0	1	0	0	1

with no modifications, also occurring in *Tallula*, *Chloropaschia*, *Roeseliodes*, *Cecidia*, *Deuterollyta*, *Anarnatula*, *Cacozealia*, and *Toripalpus*.

Identification synopsis.—*Oneida* can be identified by a forewing pattern with the postmedial line concave proximally only to M_2 , and prominent black scales proximal to the postmedial line.

Description.—Labial palpus erect; second segment longer than the sum of the length of the basal and apical segments. Maxillary palpus with three linear segments in female, and male with second segment laterally bilobed. Antenna with process of the scape in male extending to posterior end of prothorax. Male with one pair of tibial spurs on hindleg; female with two pairs of tibial spurs on hindleg. Postmedial line concave proximally only to M_2 , prominent black scales proximally.

Male genitalia: Juxta horseshoe shaped and convex midventrally; saccus with posterior edge straight.

Female genitalia: Ovipositor with lobes expanding proximally; ostium bursae membranous; corpus bursae with two signa.

Biology.—Little information is available. Two specimens of *lunulalis* have been reared in southern Ontario, Canada; on red oak in mid-August (Prentice 1965) and on beech in September in Grenville (Raizenne 1952). Specimens have been collected at elevations of 2000–7900 feet.

Distribution.—East into Nova Scotia, west into Colorado, and south to Costa Rica. The extent of species distributions in Cen-

tral America is speculative because the number of specimens available is small.

Species examined.—*lunulalis* Hulst, *luniferella* Hulst, *marmorata* (Schaus, 1912, *Po-cocera*) NEW COMBINATION, *mejona* Schaus, *grisiella* Solis, new species.

KEY TO THE SPECIES OF *ONEIDA*

1. Scales on costal margin brown; male: valva equal to or extending beyond uncus; uncus longer than 0.40 mm; uncus wider at apex than at midpoint 2
- Scales on costal margin red; male: valva not extending to uncus; uncus less than 0.40 mm; uncus equal to or less wide at apex than at midpoint 3
2. Scales on basal area of forewing black; scales on postmedial line from R_5 to M_2 black 4
- Scales on basal area red; scales on postmedial line from R_5 to M_2 brown *lunulalis*
3. Wing length 9–11 mm; length of posterior apophysis less than 0.60 mm; signum length longer than the base *mejona*
- Wing length 12–14 mm; length of posterior apophyses greater than 0.60 mm; signum length equal to or less than the base *marmorata*
4. A patch of long scales on underside of hindwing where CuA_1 meets discal cell; terminal line brown; scales on underside of forewing posterior to R_4 beige *luniferella*
- No patch of long scales on underside of hindwing where CuA_1 meets discal cell; terminal line black; scales on underside of forewing posterior to R_4 white *grisiella* new species

Oneida lunulalis Hulst

(Figs. 2, 9, 10, 21, 23)

Oneida lunulalis Hulst, 1889: 64. Lectotype male, Can., G. D. Hulst Coll. (AMNH).

Description.—Male. *Head*: Vertex red. First segment of labial palpus with brown

and red scales. Antenna with white and brown scales alternating at each segment. Scape red. Extension from scape brown.

Thorax: Patagium with red and brown scales. Terga with scales dark brown with red tips. Tegula brown. Forelegs and midlegs brown; hindlegs red.

Forewing: 9–11 mm. Basal area brown and green. Antemedial band white; area between antemedial line and median line, beginning at antemedial line olivaceous, diffusing to light brown at median line; raised scales present in this area. Costal margin, beginning at median line, red. Reniform area white; subreniform area white with chocolate-brown scales. Postmedial band prominent from costa to M_2 , dark brown proximally and white distally; dark brown posteriorly from R_5 – M_2 . Adterminal line and terminal line dark brown. Apical area dark brown and veins outlined with chocolate brown scales. Underside of forewing beige; costal margin from base to R_4 red. *Hindwing*: Mostly beige. Termen brown. Underside beige; costal margin red. No patch of longer scales between base of CuA_1 and discal cell. *Abdomen*: Terga and sterna of seventh segment with red scales.

Genitalia: Valva extending beyond uncus; length of uncus = 0.32 mm; width of uncus at apex = 0.15 mm ($n = 7$).

Female. *Head*: Similar to male, except that extension from scape not present.

Thorax: Similar to male. Foreleg and midleg brown; hindleg white.

Forewing: Similar to male. Underside brown; costal margin red at antemedial line, beige to apex with apex red. *Hindwing*: Similar to male. Underside similar except overall color brown.

Abdomen: Seventh segment with scales brown anteriorly, beige distally.

Genitalia: Length of posterior apophysis = 0.83 mm; signum length longer than diameter of base (diameter = 0.12 mm; length = 0.40 mm) ($n = 6$).

Biology.—One specimen was reared from red oak (*Quercus rubra*) in Galt and Eas-

ton's Corner in southern Ontario (Prentice 1965). Another specimen reared on beech in September from Grenville, Ontario (Rai-zenne 1952). T. Harrison reared a larva on *Quercus* sp. that was bred from ova from a female collected at UV light at Fox Ridge State Park, Cole Co., Illinois, 11-VIII-1990. Specimens have been collected at elevations from 2000 to 3865 feet.

Distribution.—In eastern North America from Nova Scotia and southern Ontario south to Florida and Texas.

Summary of material examined.—Lectotype designated by Rindge (1955) (as above); syntypes, two females, Fernald Coll[ection], Type No. 40029 (USNM); one male, Cook, 6/25/86, donated by Geo. D. Hulst; in Canada from southern Ontario, southern Quebec and Nova Scotia; in the United States: Maine, Massachusetts, New York, Connecticut, Pennsylvania, New Jersey, Maryland, Ohio, Virginia, North Carolina, Tennessee, South Carolina, Florida, Texas, Arkansas, Missouri, Illinois, Michigan.

Oneida luniferella Hulst

(Figs. 4, 11, 12)

Oneida luniferella Hulst, 1895: 53. Lectotype male, Colo[rado], Bruce, Collection G. D. Hulst (AMNH).

Oneida diploa Dyar, 1920: 198. Holotype male, Zacualpan, Mexico, July, R. Müller collector, Type No. 23634 (USNM). NEW SYNONYMY.

Oneida luniferella race *pallidalis* Barnes and Benjamin, 1924: 199. Holotype male, Tom Spalding, Stockton, Utah, VI-16-14 (USNM). NEW SYNONYMY.

Description.—Male. *Head*: Vertex with red and white scales. Labial palpus gray. Antenna with white and brown scales alternating. Scape and extension gray.

Thorax: Patagium gray with a few rufous scales. Terga with scales gray black and red tips. Tegula gray. Foreleg and midleg gray; hindleg white.

Forewing: Winglength 11–13 mm. Basal area gray. Antemedial band gray; area between antemedial and medial line red; raised scales between antemedial and medial line with white scales centrally and black scales on either side. Color of costal margin resembling rest of wing. Reniform area gray. Subreniform area gray with black scales. Postmedial band prominent from costa to M_2 ; chocolate brown proximally, white distally; patch from R_5 – M_2 with dark brown and red scales. Adterminal and terminal line chocolate brown. Apical area chocolate brown with veins outlined in black. Underside beige; costal margin red.

Hindwing: Beige. Termen brown. Underside beige; costal margin red. Area with long beige scales where base of CuA_1 meets discal cell.

Abdomen: Second and seventh segments gray with red scales.

Genitalia: Valva extends beyond uncus; length of uncus = 0.25 mm; width of uncus at apex = 0.11 mm ($n = 8$).

Female. Head: Similar to male, except that extension from scape not present.

Thorax: Similar to male.

Forewing: Similar to male. Apical area red. Underside brown; costal margin white.

Hindwing: As in male. Patch of long scales where base of CuA_1 meets discal cell not present.

Abdomen: Second segment with scales brown, beige distally.

Genitalia: Length of posterior apophysis = 0.92 mm; signum length longer than diameter (diameter = 0.18 mm; length = 0.31 mm) ($n = 7$).

Biology.—Unknown. Specimens have been collected at elevations of 4880 to 7900 feet.

Distribution.—Western United States and Mexico.

Summary of material examined.—*luniferella*: lectotype designated here (as above); types: one male, Colo[rado]., Bruce, Collection G. D. Hulst; one male, Col[orado]., Coll[ection]. G. D. Hulst and another male

labelled Coll[ection]. G. D. Hulst (AMNH); *luniferella* race *pallidalis*: holotype (as above); *diploa*: holotype (as above); one female paratype, R. Müller Collector, Zacualpan, Mexico, May, 1919, Paratype No. 23634 (USNM); in the United States: Utah, Colorado, Arizona and New Mexico; in Mexico: Chihuahua, Sinaloa, and Nuevo Leon.

Remarks.—Barnes and Benjamin (1924: 199) described *pallidalis* as a geographical race of *luniferella*, a form whose ground color is white and in all other respects like *luniferella*. The name *diploa* Dyar is a junior synonym of *luniferella*.

Oneida mejona Schaus (Figs. 1, 13, 14)

Oneida mejona Schaus, 1922: 209. Holotype male, Schaus and Barnes collection, Volcan S[an]ta. Maria, Guat[emala]., Oct[ober]., Type No. 25650 (USNM).

Description.—Male. **Head:** Vertex red. Labial palpus gray. Antenna dark brown. Scape and extension with red and brown scales.

Thorax: Patagium red. Terga scales gray black with rufous tips. Foreleg brown; tarsal segments brown and distally white. Midleg and hindleg brown.

Forewing: Winglength 9–11 mm. Basal area red and brown. Antemedial band brown with upraised scales; area between antemedial and median line green. Median line white, not prominent posteriorly. Costal margin red and brown. Reniform area white; subreniform area brown with upraised scales. Postmedial line white from costa to M_2 , less prominent posteriorly; bordered with red and brown scales; red and brown scales between R_5 – M_2 . Adterminal line and terminal line brown. Apical area and veins red and brown. Underside beige; red from Sc to posterior margin of discal cell; costal margin beige.

Abdomen: Beige.

Genitalia: Valva not extending beyond

uncus; length of uncus to base = 0.49 mm; width of uncus at apex = 0.03 mm ($n = 2$).

Female. *Head:* Similar to male, except that extension from scape not present.

Thorax: Similar to male.

Forewing: Upper side same as male. Underside brown; costal margin red.

Hindwing: Upper side same as male. Underside beige; red between costa and Sc.

Abdomen: Same as male.

Genitalia: Length of posterior apophysis = 0.57 mm; length of signum longer than diameter (diameter = 0.15 mm; length = 0.35 mm) ($n = 1$).

Biology.—Unknown.

Distribution.—Mexico and Guatemala. Because so few specimens have been collected, the range of this species is poorly known.

Summary of material examined.—Holotype (as above); Mexico: Orizaba, Coscomatepec, Cd. Victoria, and Linares; Guatemala: Volcan Santa Maria.

Oneida marmorata Schaus
(Figs. 6, 15, 16)

Oneida marmorata Schaus, 1912: 659. Holotype male, Costa Rica, Poas, May, Type No. 17653.

Description.—Male. *Head:* Vertex and labial palpus red and brown. Scape and extension red and brown.

Thorax: Winglength 12–14 mm. Patagium, tegula and thoracic scales red and brown. Foreleg and midleg red; hindleg brown.

Forewing: Basal area green and red. Antemedial band red with some black scales distally; area between antemedial and median line green; costal margin green. Reniform area red and brown. Postmedial band from costa to M_2 black proximally and white distally; red patch from R_5 – M_2 . Adterminal and terminal lines black. Apical area red. Underside beige; costal margin red.

Abdomen: Second segment gray and of seventh segment beige.

Genitalia: Valva not extending beyond uncus; length of uncus = 0.49 mm; width of uncus at apex = 0.08 mm ($n = 1$).

Female. *Head:* Similar to male except that extension from scape not present.

Thorax: Patagium white, tegula and thoracic scales red and brown.

Forewing: Similar to male.

Hindwing: Similar to male.

Abdomen: Similar to male.

Genitalia: Length of posterior apophysis = 0.85 mm; length of signum shorter than diameter (diameter = 0.046 mm; length = 0.038 mm) ($n = 1$).

Biology.—Unknown. Specimens have been captured at elevations of 2350 and 3100 m.

Distribution.—This species has been collected only from San Jose and Alajuela Provinces in Costa Rica.

Material examined.—Holotype (as above); Costa Rica: Cerro de la Muerte, 5–7 VIII 1981, 3100 m, Becker, one male; San Jose Province, San Gerardo de Dota, Cerro de la Muerte, 23 Aug. 1981, D. H. Janzen and W. Hallwachs, two males and four females; Alajuela Province, Volcan Poas, 2350 m, 12 July 1982, D. H. Janzen and W. Hallwachs, one male.

Oneida grisiella Solis, NEW SPECIES
(Figs. 3, 17, 18)

Oneida grisiella Solis, new species. Holotype male, Texas, Davis Mtns., Jeff Davis Co., 6700 feet, VII-5-1969, A. and M. E. Blanchard (AMNH).

Diagnosis.—The species is defined by two scale color characteristics: a black terminal line and white scales on the underside of the forewing posterior to R_4 .

Description.—Male. *Head:* Vertex and labial palpus gray. Scape and extension black.

Thorax: Patagium, tegula and thoracic scales gray. Foreleg and midleg black; hindleg gray.

Forewing: Winglength 10–11 mm. Basal area gray. Antemedial band gray with some

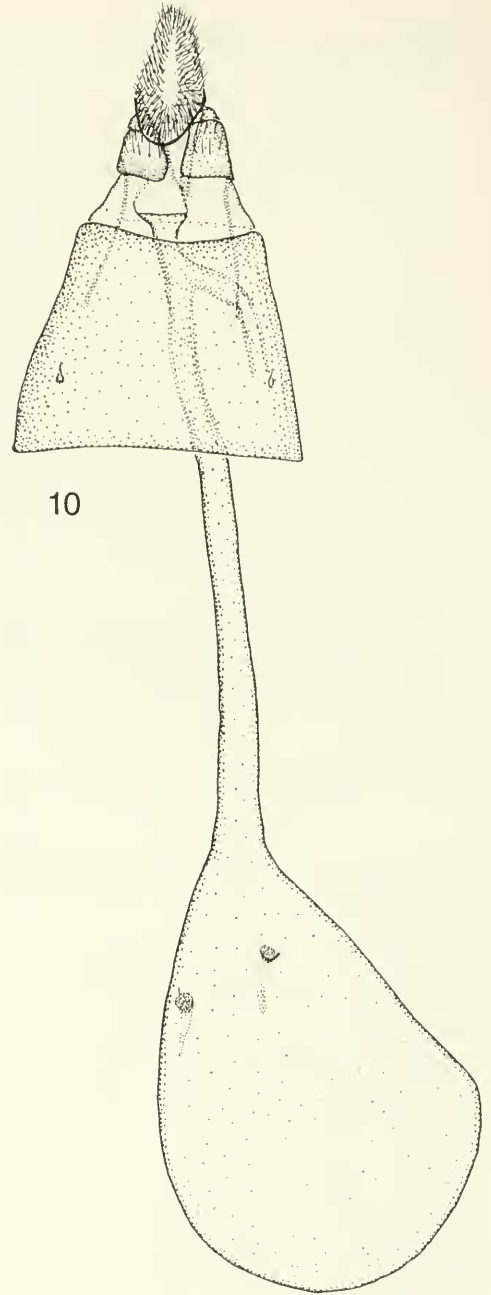
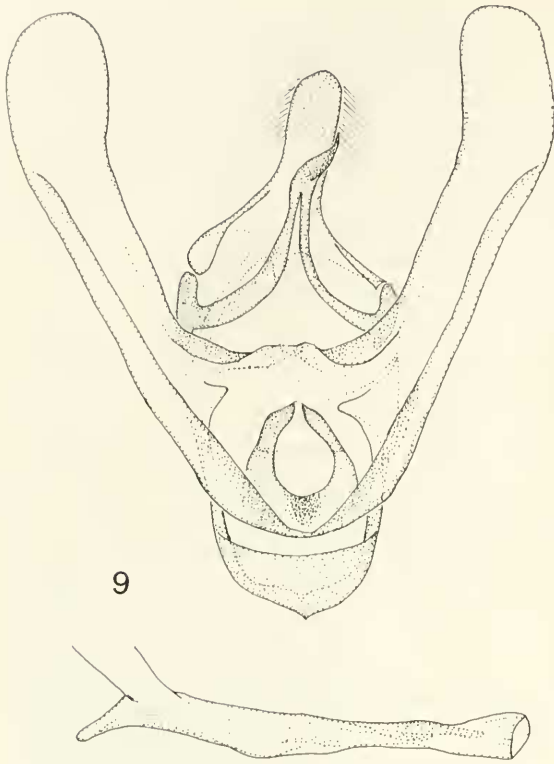


Fig. 9. Male genitalia of *O. lunulalis*, MAS #247.

Fig. 10. Female genitalia of *O. lunulalis*, MAS #250.

black scales; area between antemedial and median lines red; raised scales in this area with white scales medially and black scales on each side. Costal margin gray. Reniform

area gray. Postmedial band from costa to M_2 with black scales proximally and white scales distally; black patch from R_5 – M_2 . Ad-terminal and terminal lines black. Apical

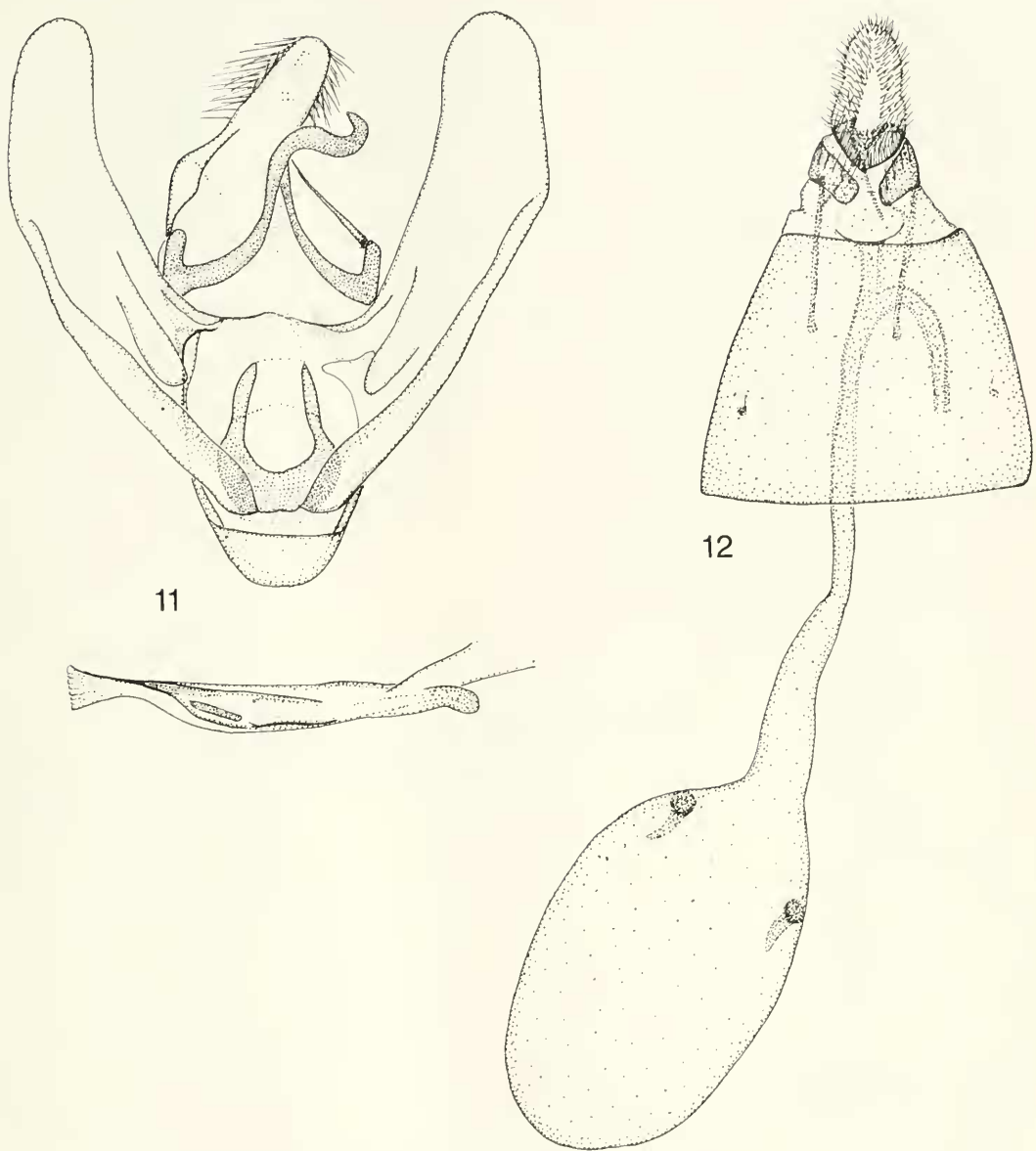


Fig. 11. Male genitalia of *O. luniferella*, MAS #245.
Fig. 12. Female genitalia of *O. luniferella*, MAS #256.

area black. Underside beige; costal margin white.

Hindwing: Beige; costal margin light brown.

Abdomen: Second segment gray and seventh segment beige.

Genitalia: Valva extends beyond uncus;

length of uncus = 0.37 mm; width of uncus at apex = 0.11 mm (n = 4).

Female. Same as male.

Genitalia: Length of posterior apophysis = 0.77 mm; signum length longer than diameter (diameter = 0.06 mm; length = 0.14 mm) (n = 2).

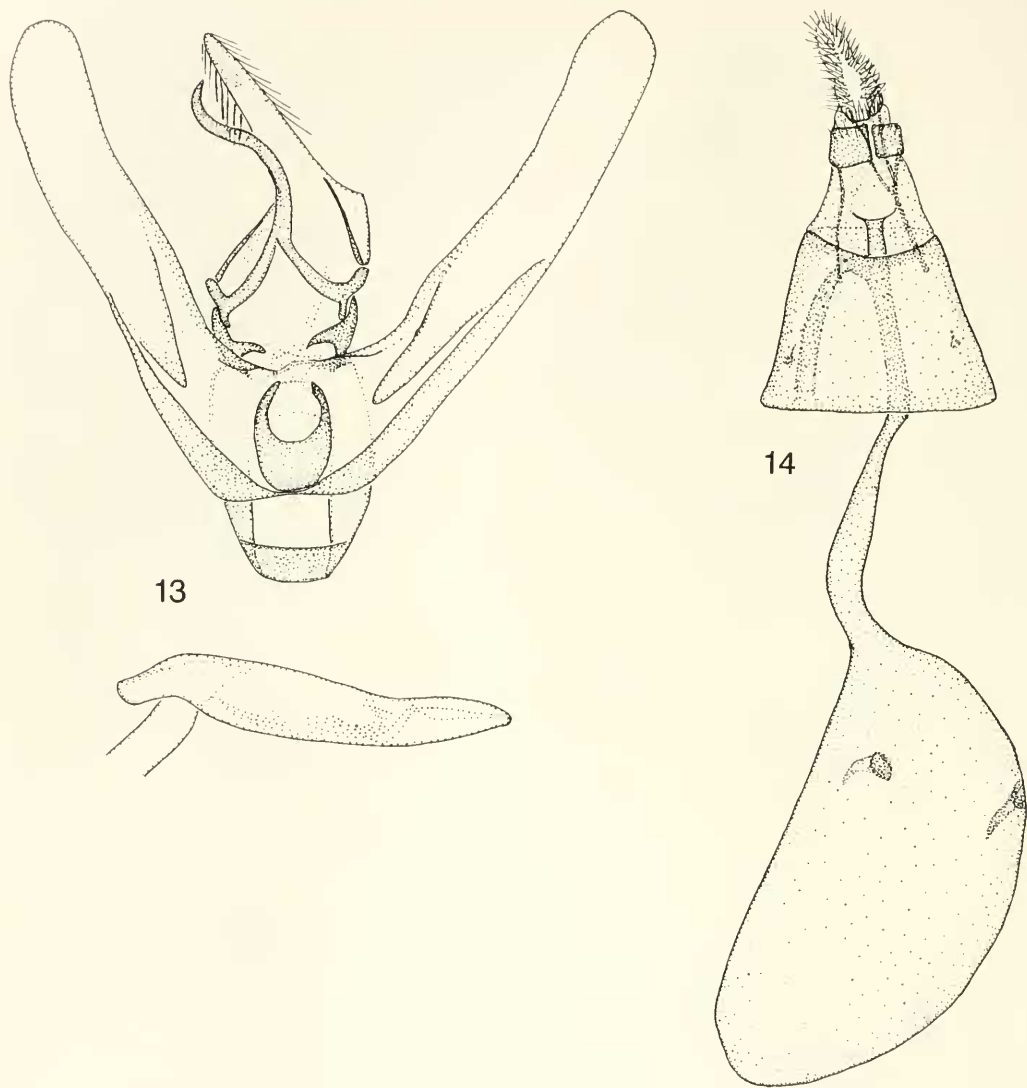


Fig. 13. Male genitalia of *O. mejona*, MAS #248.

Fig. 14. Female genitalia of *O. mejona*, MAS #253.

Biology.—Unknown. Specimens have been collected at elevations of 5000 to 6700 feet.

Distribution.—Endemic to west Texas.

Material examined.—Holotype (as above); paratypes: one female and five males (AMNH and USNM); Culberson Co., five males and six females, Sierra Diablo Wildlife Management Area, 6000 feet, VII–II, 1971, A. and M. E. Blanchard; Brewster Co.,

11 males, two females, Alpine, 5–7000 feet, 14–20.V.1926, 15–20 Aug. 1926, 20–30.V.1926, 25–31 July 1926, 5–10 Sept. 1926, 1–7.IV.1926, O. C. Poling (USNM); Big Bend Co., one male, SW Texas, 15/30 1926, O. C. Poling (USNM).

Etymology.—The species name *grisiella* refers to the overall gray appearance composed of black and white scales that is unique to the genus.

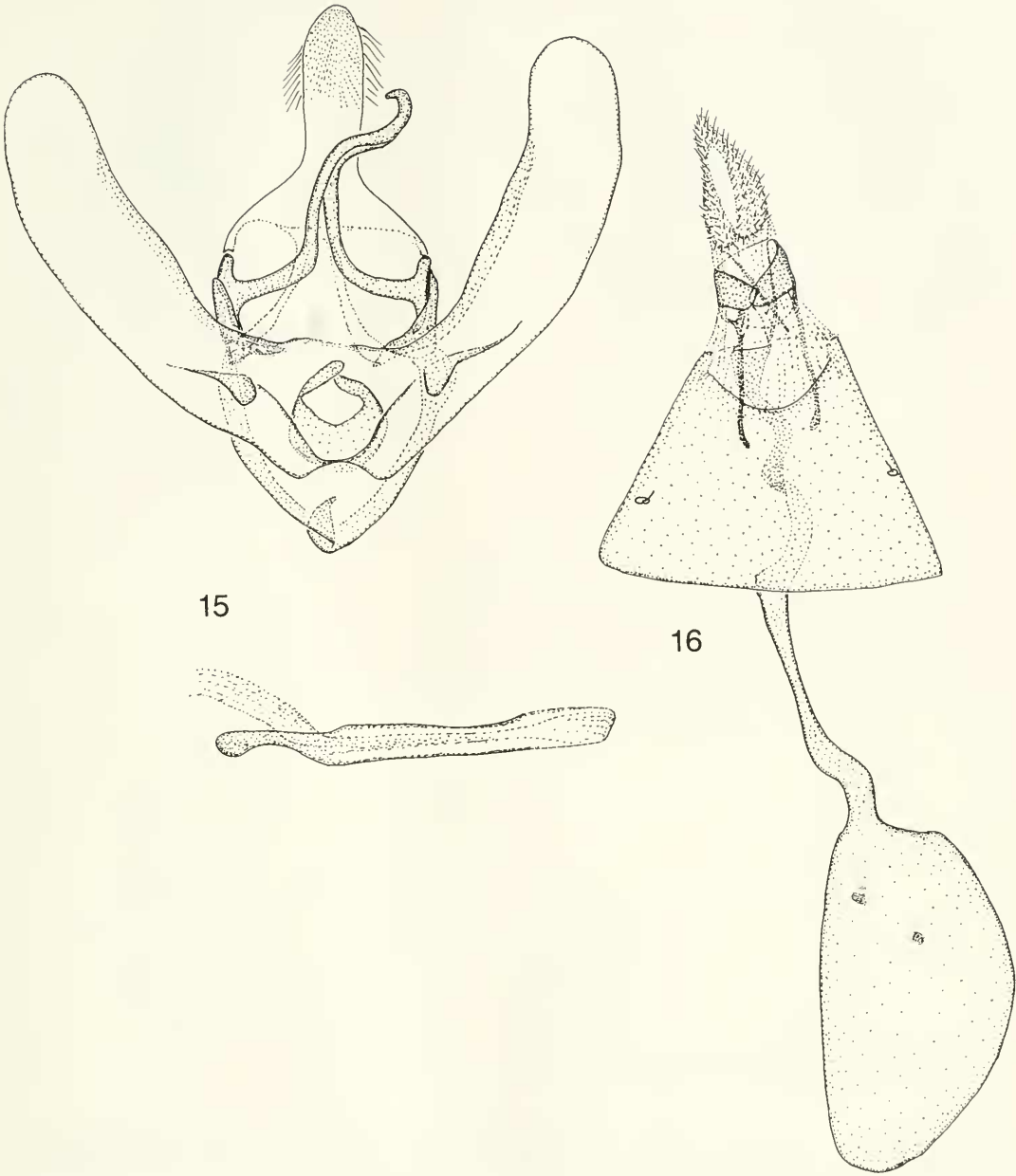


Fig. 15. Male genitalia of *O. marmorata*, MAS #621.
Fig. 16. Female genitalia of *O. marmorata*, MAS #622.

***Dasyvesica* Solis, NEW GENUS**
(Figs. 5, 19, 20, 22, 24)

Type species. *Pococera nepomuca* Schaus, 1925, Ann. Carnegie Mus. 16: 16.

Diagnosis.—This genus is defined by two autapomorphies in the male genitalia, a

patch of thick, deciduous setae on the sacculus, and the base of the juxta more heavily sclerotized than the arms. Other homoplasious synapomorphies are: (1) a tubulate second labial segment, as in *Cacozelia*, *Tancoa* Schaus, *Pococera* Zeller, *Milgithea* Schaus, *Lacalma* Janse, and two new un-

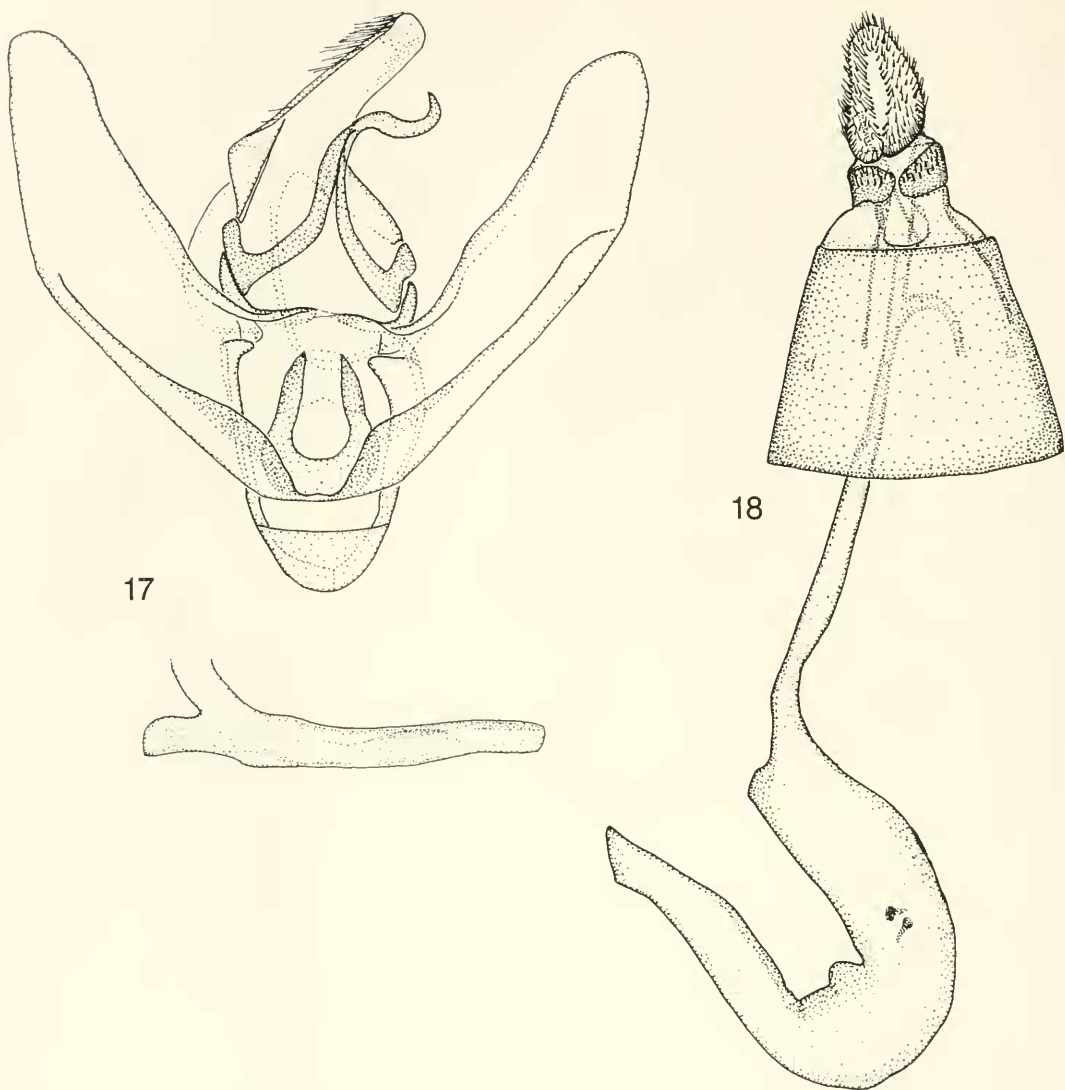


Fig. 17. Male genitalia of *O. grisiella*, MAS #246.

Fig. 18. Female genitalia of *O. grisiella*, MAS #252.

described genera, (2) the third maxillary segment arising from the base of the second segment, as in *Pococera*, *Milgitha*, *Cacozelia*, *Toripalpus*, *Lacalma*, *Macalla* Walker, and (3) cornuti present, as in *Macalla*.

Identification synopsis.—The genus can be identified by the following forewing pattern: postmedial line proximally concave from M_1 to CuA_1 , and then concave again to CuA_2 to the posterior margin of the wing. The reniform spot distally with darker scales.

The median line is present from M_2 to $1A+2A$.

Description.—Male. *Head*: Scape longer than base of pedicel; second labial segment tubulate; third maxillary segment arising at base of second segment.

Wing: Retinaculum a group of hooked setae below Cu. Forewing CuP vein absent; $1A+2A$ forked basally. Hindwing with Sc and Rs coincident.

Male genitalia: Arms of juxta not reach-



Fig. 19. Male genitalia of *D. nepomuca*, MAS #740.
Fig. 20. Female genitalia of *D. nepomuca*, MAS #616.

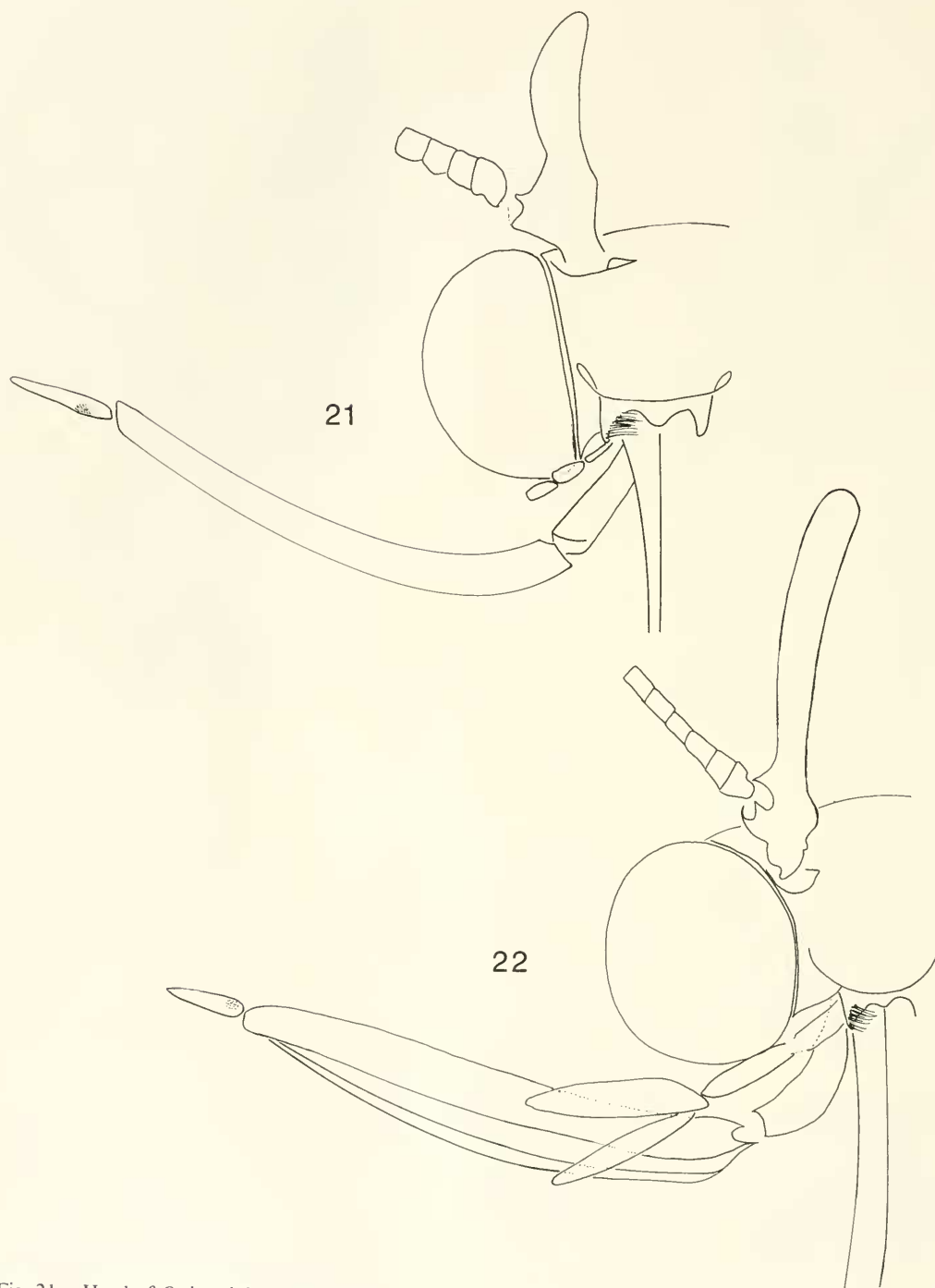
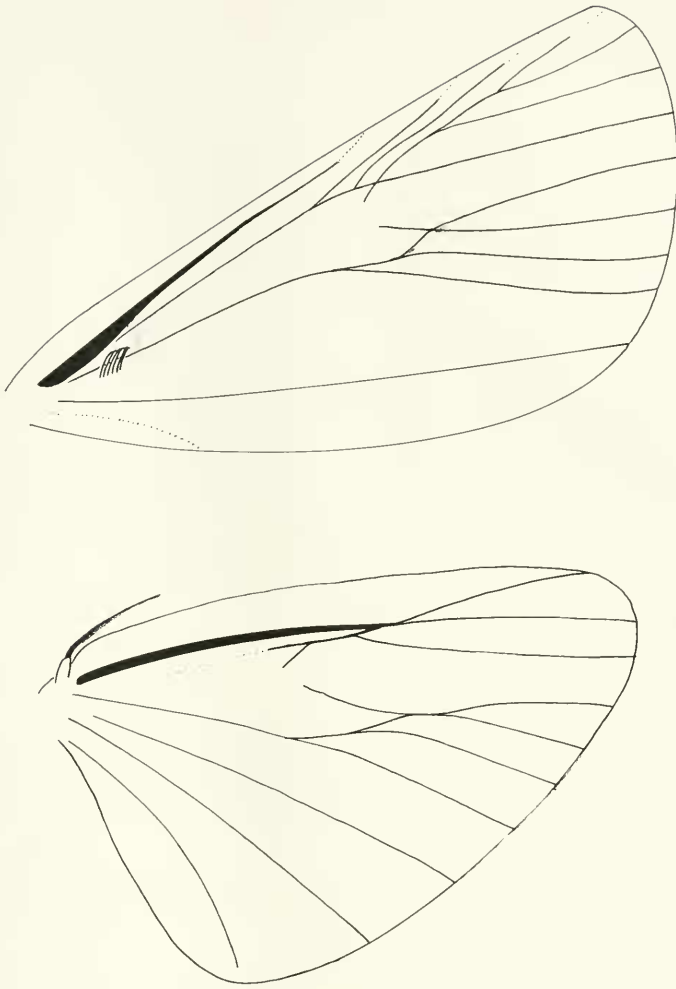


Fig. 21. Head of *O. lunulalis*, MAS #274.
Fig. 22. Head of *D. nepomuca*, MAS #615.



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Fig. 23. Wings of *O. lunulalis*, MAS #274.

ing costal process; median lobe of valva short, round nub; tegumen "sclerite" reaching a midventral position, tip less broad than base; uncus base lacking U-shaped sclerotized structure; vesica with cornuti.

Female genitalia: Lamella antevaginalis without fold; two signa.

Included species.—*D. nepomuca* (Schaus, 1925, *Pococera*) NEW COMBINATION, *D. lophotalis* (Hampson, 1906, *Jocara*) NEW COMBINATION, *D. crinitalis* (Schaus, 1922, *Jocara*), NEW COMBINATION.

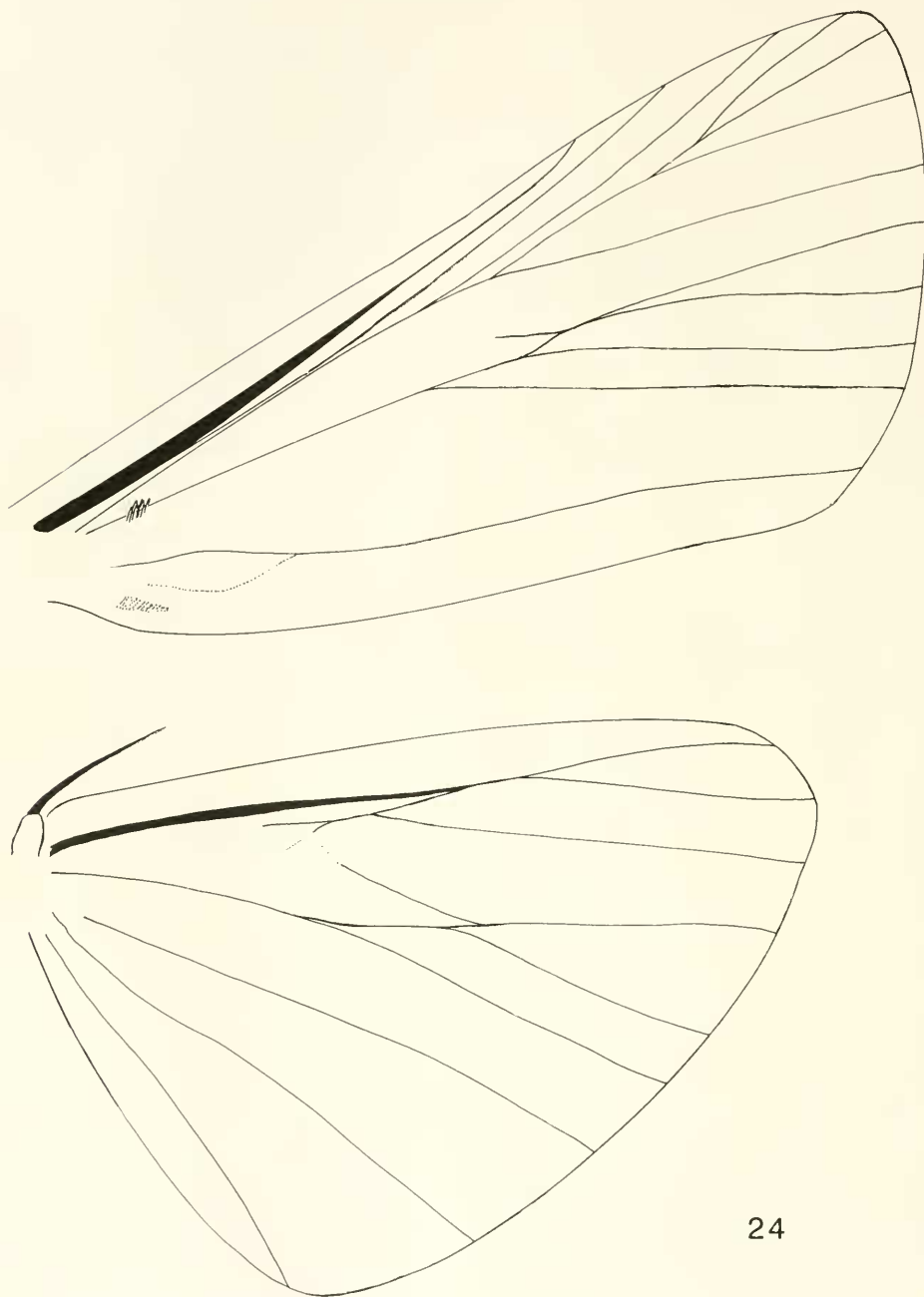
Distribution.—Venezuela and Bolivia to

Quintana Roo in Mexico and to Jamaica in the Caribbean.

Biology.—Unknown.

Remarks.—The three described species in *Dasyvesica* were placed in *Jocara* and *Pococera*. At least two undescribed, South American species are in the USNM. Species are distinguished by wing color and pattern, area on the sacculus that is covered by setae, and length of the extension of the scape.

Etymology.—The generic name is derived from the Greek *dasys* meaning "thick with hair" and the Latin *vesica* (feminine)



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Fig. 24. Wings of *D. nepomuca*, MAS #615.

meaning "bladder" in reference to the cornuti on the vesica.

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